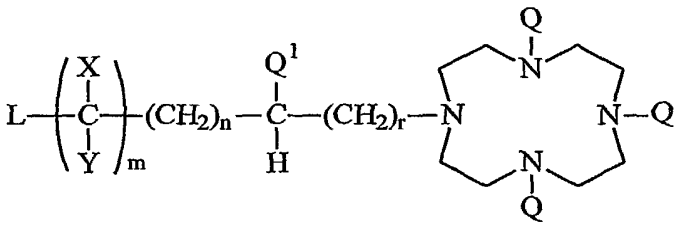
WHAT IS CLAIMED IS:

1. An ^{225}Ac complex comprising a functionalized chelant compound of the formula I



I

wherein:

each Q is independently hydrogen or $(CHR^5)_pCO_2R$;

Q^1 is hydrogen or $(CHR^5)_wCO_2R$;

each R independently is hydrogen, benzyl or C_1-C_4 alkyl; with the proviso that at least two of the sum of Q and Q^1 must be other than hydrogen;

each R^5 independently is hydrogen; C_1-C_4 alkyl or (C_1-C_2 alkyl)phenyl;

X and Y are each independently hydrogen or may be taken with an adjacent X and Y to form an additional carbon-carbon bond;

n is 0 or 1;

m is an integer from 0 to 10 inclusive;

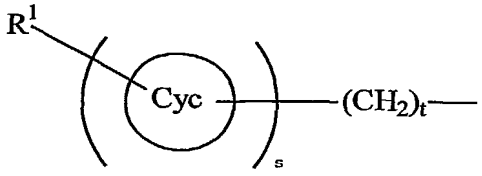
p is 1 or 2;

r is 0 or 1;

w is 0 or 1;

with the proviso that n is only 1 when X and/or Y form an additional carbon to carbon bond, and the sum of r and w is 0 or 1;

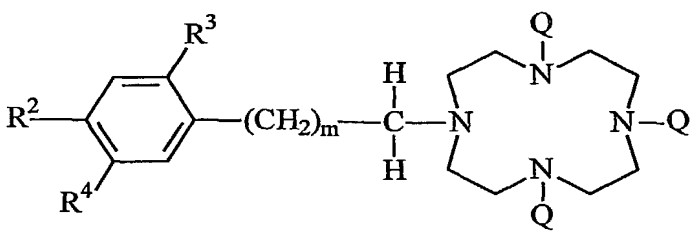
L is a linker/spacer group covalently bonded to, and replaces one hydrogen atom of one of the carbon atoms to which it is joined, said linker/spacer group being represented by the formula



wherein

s is an integer of 0 or 1;
t is an integer of 0 to 20 inclusive;
R^1 is an electrophilic or nucleophilic moiety which allows for covalent attachment to an antibody or fragment of thereof, or synthetic linker which can be attached to an antibody or fragment thereof, or precursor thereof; and
Cyc represents a cyclic aliphatic moiety, aromatic moiety, aliphatic heterocyclic moiety, or aromatic heterocyclic moiety, each of said moieties optionally substituted with one or more groups which do not interfere with binding to an antibody or antibody fragment;
with the proviso that when s, t, m, r, and n are 0, then R^1 is other than carboxyl; or
a pharmaceutically acceptable salt thereof; complexed with ^{225}Ac.

2. The ^{225}Ac complex of Claim 1 wherein the functionalized chelant is a compound of formula II



II

wherein:

each Q independently is hydrogen or CHR^5COOR; with the proviso that at least two of Q must be other than hydrogen

each R independently is hydrogen benzyl or C_1-C_4 alkyl;

m is integer from 0 to 5 inclusive;

R^2 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

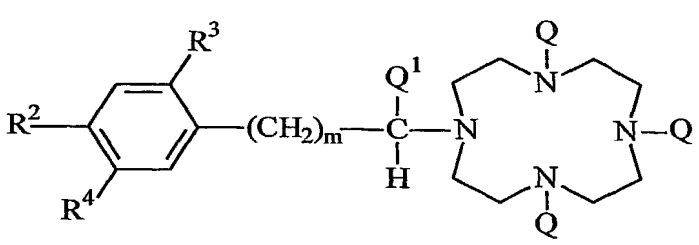
R^3 is selected from the group consisting of C_1-C_4 alkoxy, $-OCH_2COOH$, hydroxy and hydrogen;

R^4 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

each R^5 independently is hydrogen or C_1-C_4 alkyl;

with the proviso that R^2 and R^4 cannot both be hydrogen but one of R^2 and R^4 must be hydrogen; or a pharmaceutically acceptable salt thereof.

3. The ^{225}Ac complex of Claim 1 wherein the functionalized chelant is a compound of formula III



III

wherein:

each Q independently is hydrogen or CHR^5COOR;

Q^1 is hydrogen or $(CHR^5)_wCO_2R$; with the proviso that at least two the sum of Q and Q^1 must be other than hydrogen and one Q is hydrogen;

each R independently is hydrogen benzyl or C_1-C_4 alkyl;

m is integer from 0 to 5 inclusive;

w is 0 or 1;

R^2 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

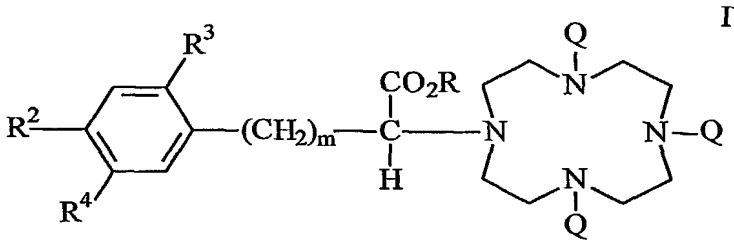
R^3 is selected from the group consisting of C_1-C_4 alkoxy, $-OCH_2COOH$, hydroxy and hydrogen;

R^4 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

each R^5 independently is hydrogen or C_1-C_4 alkyl;

with the proviso that R^2 and R^4 cannot both be hydrogen but one of R^2 and R^4 must be hydrogen; or a pharmaceutically acceptable salt thereof.

4. The ^{225}Ac complex of Claim 1 wherein the fuctionalized chelant is a compound of formula IV



IV

wherein:

each Q independently is hydrogen or CHR^5COOR; with the proviso that at least one Q must be other than hydrogen;

each R independently is hydrogen benzyl or C_1-C_4 alkyl;

m is integer from 0 to 5 inclusive;

R^2 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

R^3 is selected from the group consisting of C_1-C_4 alkoxy, $-OCH_2COOH$, hydroxy and hydrogen;

R^4 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

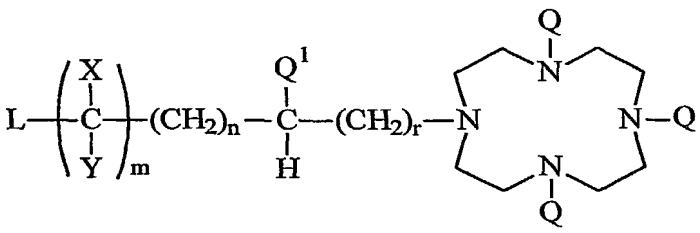
each R^5 independently is hydrogen or C_1-C_4 alkyl;

with the proviso that R^2 and R^4 cannot both be hydrogen but one of R^2 and R^4 must be hydrogen; or

a pharmaceutically acceptable salt thereof.

5. The ^{225}Ac complex of Claim 1 wherein the functionalized chelant compound is 1-[(2-methoxy-5-isothiocyanatophenyl)-carboxymethyl]-4,7,10-triscarboxy-methyl-1,4,7,10-tetraazacyclododecane (MeO-DOTA-NCS).

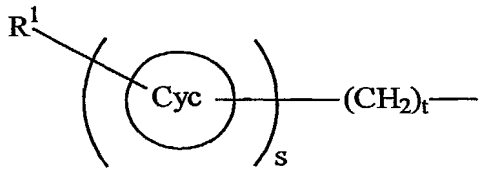
6. An ^{225}Ac conjugate comprising a functionalized chelant compound of the formula I



I

wherein:

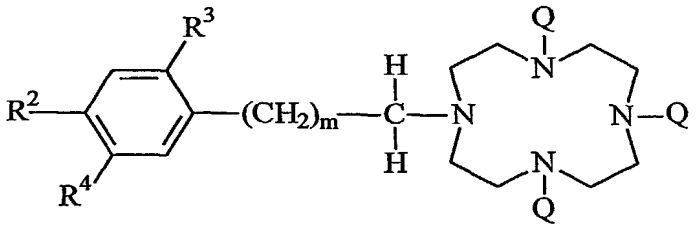
each Q is independently hydrogen or $(CHR^5)_pCO_2R$;
Q^1 is hydrogen or $(CHR^5)_wCO_2R$;
each R independently is hydrogen. benzyl or C_1-C_4 alkyl; with the proviso that at least two of the sum of Q and Q^1 must be other than hydrogen;
each R^5 independently is hydrogen; C_1-C_4 alkyl or (C_1-C_2 alkyl)phenyl;
X and Y are each independently hydrogen or may be taken with an adjacent X and Y to form an additional carbon-carbon bond;
n is 0 or 1;
m is an integer from 0 to 10 inclusive;
p is 1 or 2;
r is 0 or 1;
w is 0 or 1;
with the proviso that n is only 1 when X and/or Y form an additional carbon-carbon bond, and the sum of r and w is 0 or 1;
L is a linker/spacer group covalently bonded to, and replaces one hydrogen atom of one of the carbon atoms to which it is joined, said linker/spacer group being represented by the formula



wherein

s is an integer of 0 or 1;
t is an integer of 0 to 20 inclusive;
R^1 is an electrophilic or nucleophilic moiety which allows for covalent attachment to an antibody or fragment of thereof, or synthetic linker which can be attached to an antibody or fragment thereof, or precursor thereof; and
Cyc represents a cyclic aliphatic moiety, aromatic moiety, aliphatic heterocyclic moiety, or aromatic heterocyclic moiety, each of said moieties optionally substituted with one or more groups which do not interfere with binding to an antibody or antibody fragment;
with the proviso that when s, t, m, r, and n are 0, then R^1 is other than carboxyl; or
pharmaceutically acceptable salt thereof;
complexed with ^{225}Ac; and covalently attached to a biological molecule.

7. The ^{225}Ac conjugate of Claim 6 wherein the functionalized chelant is a compound of formula II



II

wherein:

each Q independently is hydrogen or CHR^5COOR; with the proviso that at least two of Q must be other than hydrogen

each R independently is hydrogen benzyl or C_1-C_4 alkyl;

m is integer from 0 to 5 inclusive;

R^2 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

R^3 is selected from the group consisting of C_1-C_4 alkoxy, $-OCH_2COOH$, hydroxy and hydrogen;

R^4 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

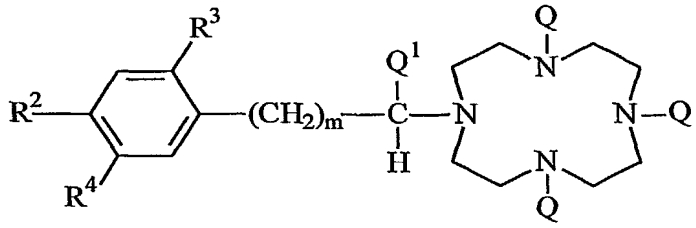
each R^5 independently is hydrogen or C_1-C_4 alkyl;

with the proviso that R^2 and R^4 cannot both be hydrogen but one of R^2 and R^4 must be hydrogen; or

a pharmaceutically acceptable salt thereof.

8. The ^{225}Ac conjugate of Claim 6 wherein the functionalized chelant is a compound of formula III

III



wherein:

each Q independently is hydrogen or CHR^5COOR;

Q^1 is hydrogen or $(CHR^5)_wCO_2R$; with the proviso that at least two the sum of Q and Q^1 must be other than hydrogen and one Q is hydrogen;

each R independently is hydrogen benzyl or C_1-C_4 alkyl;

m is integer from 0 to 5 inclusive;

w is 0 or 1;

R^2 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

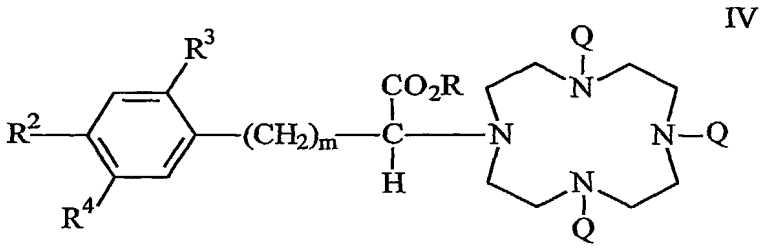
R^3 is selected from the group consisting of C_1-C_4 alkoxy, $-OCH_2COOH$, hydroxy and hydrogen;

R^4 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

each R^5 independently is hydrogen or C_1-C_4 alkyl;

with the proviso that R^2 and R^4 cannot both be hydrogen but one of R^2 and R^4 must be hydrogen; or a pharmaceutically acceptable salt thereof.

9. The ^{225}Ac conjugate of Claim 6 wherein the functionalized chelant is a compound of formula IV



IV

wherein:

each Q independently is hydrogen or CHR^5COOR; with the proviso that at least one Q must be other than hydrogen;

each R independently is hydrogen, benzyl or C_1-C_4 alkyl;

m is integer from 0 to 5 inclusive;

R^2 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

R^3 is selected from the group consisting of C_1-C_4 alkoxy, $-OCH_2COOH$, hydroxy and hydrogen;

R^4 is selected from the group consisting of hydrogen, nitro, amino, isothiocyanato, semicarbazido, thiosemicarbazido, carboxyl, bromoacetamido and maleimido;

each R^5 independently is hydrogen or C_1-C_4 alkyl;

with the proviso that R^2 and R^4 cannot both be hydrogen but one of R^2 and R^4 must be hydrogen; or

a pharmaceutically acceptable salt thereof.

10. The ^{225}Ac conjugate of Claim 6 wherein the functionalized chelant compound is 1-[(2-methoxy-5-isothiocyanatophenyl)-carboxymethyl]-4,7,10-triscarboxy-methyl-1,4,7,10-tetraazacyclododecane (MeO-DOTA-NCS).

11. The ^{225}Ac conjugate of any one of Claims 6 to 10 wherein the biological molecule is an antibody or antibody fragment.

12. The ^{225}Ac conjugate of any one of Claims 6 to 10 wherein the biological molecule is selected from the group of antibodies consisting of NuM195, CC-49, CC-49 $F(ab')_2$, CC-83, and CC-83 $F(ab')_2$.

13. The ^{225}Ac conjugate of Claim 6 wherein the functionalized chelant compound of the conjugate is 1-[(2-methoxy-5-isothiocyanatophenyl)-carboxymethyl]-4,7,10-triscarboxy-methyl-1,4,7,10-tetraazacyclododecane and the biological molecule is selected from the group of antibodies consisting of HuM195, CC-49, CC-49 $F(ab')_2$, CC-83, and CC-83 $F(ab')_2$.

14. The ^{225}Ac conjugate of Claim 13 wherein the functionalized chelant compound of the conjugate is 1-[(2-methoxy-5-isothiocyanatophenyl)-carboxymethyl]-4,7,10-triscarboxy-methyl-1,4,7,10-tetraazacyclododecane and the biological molecule is HuM195 antibody.

15. A pharmaceutical formulation comprising the ^{225}Ac conjugate of any one of Claims 6 to 10 with a pharmaceutically acceptale carrier.

16. A pharmaceutical formulation comprising the ^{225}Ac conjugate of Claim 12 with a pharmaceutically acceptable carrier.

17. A pharmaceutical formulation comprising the ^{225}Ac conjugate of Claim 13 or Claim 14 with a pharmaceutically acceptable carrier.

18. A method of the therapeutic treatment of a mammal having cancer which comprises administering to said mammal a therapeutically effective amount of a pharmaceutical formulation of Claim 15.

19. A method of the therapeutic treatment of a mammal having cancer which comprises administering to said mammal a therapeutically effective amount of a pharmaceutical formulation of Claim 16.

20. A method of the therapeutic treatment of a mammal having cancer which comprises administering to said mammal a therapeutically effective amount of a pharmaceutical formulation of Claim 17.